PROJECT OVERVIEW

Project Name:	PPE Assessment for VCM Unit
Company Address:	Westlake Vinyl Corporation, LP 4338 Highway 73 Geismar, Louisiana 70734
Project Date:	February 27, 2018

This document serves as documentation of the PPE Hazard Assessment and Certification, as required by OSHA regulation 29 CFR 1910.132(d)(2).

The hazard assessment was conducted for Westlake Vinyls, Geismar, LA.

Date(s) of Hazard Assessment: February 27, 28, 2018

Name of workplace evaluated: VCM Unit, Geismar, LA

Person(s) Performing and Certifying Hazard Assessment: Gregory Thorn, OHST; Blaine Ayres, CIH and Terry Donahue, VCM unit operator trainer of Westlake.

Summary:

Westlake Vinyls operates a VCM unit that uses chlorine, ethylene and oxygen to produce EDC. The EDC is distilled and then sent to two cracking furnaces that produce Vinyl Chloride Monomer and Hydrogen Chloride. There are two methods of produce EDC in the VCM unit, Direct Chlorination and Oxychlorination. Direct Chlorination uses chlorine and ethylene in the presence of iron produce ethylene dichloride. This EDC is then sent to the Wash system where the iron is removed and the EDC is neutralized and then sent to the Wet Crude EDC Tanks. Oxychlorination uses Hydrogen Chloride, produced from the cracking furnaces or BASF, Ethylene and Oxygen passing through 3 fixed bed catalyst filled reactors to produce ethylene dichloride. The catalyst for the reaction is copper chloride. The Oxychlorination EDC is also sent through a wash system. The EDC is then fed to one of two distillation trains that remove the light and heavy byproducts from the EDC. The purified EDC can go to: two Furnace Feed Tanks, Two Pure EDC Tanks or one Barge loading Tank. The light ends go to the Utility Vent Header to be oxidized in the Incinerator area. The heavy ends go to the IFS tank from which rail cars are loaded and shipped out. Purified EDC is then fed to two cracking Furnaces where hydrogen chloride, VCM are produced. Only 50 to 60% of the EDC is cracked in the furnaces. The outlet of the furnaces are cooled in Quench Columns and then combine in the Quench Accumulator. The vapor (mostly HCl) feed the HCl Column at tray 52 and the liquid at tray 48 where the HCl is removed overhead and VCM and EDC come out the bottom. The VCM and EDC from the HCl column bottoms feed the VCM column where they are separated. The Overhead VCM goes through caustic filled dryers before going to VCM Storage tanks. The EDC from the bottom of the VCM column is chlorinated and sent to the EDC Recycle Column where the lights and heavies are removed. The VCM unit has two Incinerators to remove any gaseous waste, two Steam Strippers to remove any VCM or EDC from process and non-process waste water before being sent to Biological Waste treatment.

Operators work out of a common control room, with assignment to Area 1, Area 2, Tank Farm, Rover and DCS(2) responsibilities. The process is enclosed, with primary hazards identified as potential exposures, emissions to ambient air may occur due to system failures, maintenance activities, fugitive emissions, human errors and emergency situations. Workers in the facility may be exposed to emissions of vinyl chloride, hydrogen chloride and chlorine.

Vinyl chloride is a known toxic carcinogen with long term potential health effects if over to permissible exposure limit of 1 ppm. EDC is a suspect carcinogen with an OEL of 10 ppm. Hydrogen chloride is a toxic corrosive that causes respiratory tract irritation in small quantities. Chlorine is also a toxic corrosive that causes respiratory irritation in small quantities. VCM and EDC are monitored 24 hours a day within the VCM unit with alarms set at 5ppm to notify personnel of an emission. Routine industrial hygiene monitoring is performed on all outside operator positions and vapors controlled to within allowable limits. Control measures include administrative, engineering and personal protective equipment.

Operators catch samples every four hours. The samples are brought to the control room lab where the analysis is performed. The control room lab process samples are run for excess chlorine (EDC), caustic strength and acid strength. Full-face air purifying respirators with organic vapor/acid gas cartridge /P100 filters and neoprene gloves are required to obtain the samples, safety glasses and vinyl gloves to run the samples. Normal sample result for excess chlorine on the Direct Chlorination reactors EDC is ≈500ppm. Normal sample result for caustic strength is 2.5%. Normal sample result for acid strength is ≈1%. Samples are caught twice a shift to bring to the main lab for analysis. Same PPE is required for the main lab samples. The EDC samples are caught in 4 ounce vials. The VCM samples are caught in "bombs". The sample is run through the bomb to the utility vent header using a nitrogen eductor. The bomb is blocked in and the connecting hoses are evacuated using the eductor. Goggle areas are well defined.

The unit has 4 cooling towers, each with a sulfuric acid tank and chlorine cylinders. The sulfuric acid tanks are managed by a vendor. Operator involvement appears to be limited to monitoring levels with little or no contact with the contents. The chlorine is vendor supplied and managed in one ton cylinders. Minimal personal protective equipment for initial line break calls for the operator to have a supplied air respirator, chemical resistant hand protection with a standby person to swap chlorine cylinders. This task is performed about every three months on each cooling tower.
Job Training Observations (JTOs) are performed by the Lead Operator of each shift monthly to evaluate understanding of the employee's comprehensive application of the procedure. The employee is monitored during SOP work practices and a report is completed and reviewed with the operator making recommendations where needed to ensure proper PPE is utilized and specific step by step performance is done correctly.

A noise survey and contour map were completed in December 2017. Based on this data, much of the unit was found to have noise levels in the 85 – 100 dBA range with exception of three areas;

- Area 1, steam blowdown occurring at the 600 pound steam header, West of cooling tower
- Area 2, the compressor for Oxy A & B train circulators
- Area 3, forced draft fans East of the furnace

Westlake provides a choice of three hearing protectors to employees: 3M EAR foam earplug #311-1254 (NRR=33dB), 3M EAR hardhat earmuff #330-3031 (NRR=21dB), and 3M EAR Peltor Optime 101 earmuff #H7A (NRR=27). OSHA provides several methods for estimating the adequacy of hearing protector attenuation (29CFR1910.95 Appendix B); the most common is subtraction of 7dB to give the effective NRR, or 26 dB for the earplugs provided at the facility, 14 dB for hardhat earmuffs and 20 dB for Optime 101 earmuffs. Additional NRR de-rating if often conservatively applied. Double protection (earplugs and muffs) is appropriate for operators spending significant time in areas identified >100 dBA.

NOTE: Westlake Vinyls has minimal PPE requirements where all personnel that enter the production areas must have;

Hard hat
Safety glasses w/ side shields
Hearing protection
Fire retardant clothing
Safety, protective-toed footwear
Gloves (general purpose)
Chlorine, acid gas escape respirator
Chemical Goggles (if entering specific areas)

Recommendations

- Ensure that employees required to wear respirators are included in a respiratory protection program (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.
- Ensure that PPE and safety requirements are included in SOPs, and control SOP distribution to ensure availability of the latest revision at the point of use.
- Follow MOC change procedure to endure process changes include continued assessment.

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Table 1: Westlake Chemicals Hazard assessment matrix:

Hazard Assessment completed by: Gregory Thorn, Terry Donahue & Blaine Ayres

Date: February 27 & 28, 2018 **Assessment #: VCM Unit** This document serves as documentation of the PPE Hazard Assessment and Certification, as required by OSHA 29 CFR 1910.132 (d)(2)

Job Title/ Classification: VCM Unit Operator

Process Unit Area: VCM Unit

Department: Operations

Task/ Process/ Job Description: Normal Operations / VCM Unit Operator

General Protection: All employees are required to wear safety glasses with side shields, ANSI approved footwear, flame retardant clothing (Protera, Nomex-cotton blend and FR Carhart), Acid-gas (Cl2) escape respirator and a Class B hard hat are standard personal protective equipment (PPE) when entering an area with hazardous materials or processes. Hearing protetction is required in hearing protection designated areas. The General personal protective measures listed below are required for working with all materials at the Geismar Facility. Goggles are required in idenified areas. Additional PPE requirements for each material are idetnifed in teh table below.

Unit		EYE PROTECTION (Chemical/ Thermal)			HAND PROTECTION (Chemical/ Thermal)					BODY PROTECTION (Chemical/ Thermal/ Falls)				RESPIRATORY PROTECTION Supplied-air Air-purifying respirator (APR			OTHER
		Safety Glasses w/ sideshields	Chem goggle (1)	Face shield (1)	Leather gloves (2)	Cut resistant glove	Nitrile glove	Neoprene	Temptec insulated thermal glove (alternative)	Rain suit	Chemical protective coveralls/ jacket	Rubber Boots	Fall Protection Safety Harness	Line-breaking and/ or APR not approved (3)	Acid gases (1)	HEPA filter cartridges	Stand by Radio
										Minimal contact	Line breaking/ Hazardous contact				APR with OVAG/HEPA cartridges	APR particulate cartridges	
VCM Unit	sampling conducted in the unit at sample stations.		✓					✓							✓ (6)		
	analysis performed in the control room lab.	✓					✓										
	sampling and laboratory analysis .	✓					✓										
	4.) 98% Sulfuric Acid Day tank and truck off-loading. (4)		✓	✓				✓	✓		✓	✓					
	hypochlorinator at one ton chlorine cylinder						✓							✓			✓

OPT: Recommended but not required.

(1) Where respiratory protection is needed, a full facepiece respirator may be used in place of a half facepiece and a chemical goggle. If a half mask respirator is used, a chemical goggle must still be used.

(2) Cannot be worn by itself where chemical contact is likely. Use in combination with a chemical resistant glove.

(3) Supplied Air required for initial line break.

(4) Ensure maintenance of eyewash/ deluge stations.

(5) Hearing protection and chlorine escape respirator are generally required PPE.

(6) Air purifying respirators required when performing EDC sampling when closed loop sampling is not available.

Table 2: PPE Inventoried in the site Warehouse Store Stock.

Manufacturer	Model	Description	Link
Gloves			
Ansell	92-600	nitrile chemical	Link
Westchester	750	Cotton poly brown jersey glove	Link
Kimberly Clark	55084	6-mil nitrile exam	Link
Memphis	6412	green pvc jersey lined chemical glove	Link
Showa	730	green nitrile, flock-lined chemical glove	Link
Showa	6780R	Neoprene, rough grip, lined chemical	Link
Respirators			
MSA	200LS	Half Mask respirator	Link
MSA	815366	Multi-gas cartridge	Link
3M	8212	N95 welding	Link
Garments			
NEESE	96SJ	Chemical splash suit	Link
Dupont Tychem	CPF3	Chemical splash suit	Link
Hearing Protection			
3M E-A-R	311-1254	NRR 33dB foam earplug	Link
3M E-A-R	330-3031	NRR 21dB 2000H hardhat earmuff	Link
3M E-A-R	H7A	NRR 27 dB Peltor Optime 101 earmuff	Link